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ORIGINAL RESEARCH

Defining quality of preventive oral health services in a northern First Nations community: a concept mapping study

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ABSTRACT:

Introduction: In partnership with the Norway House Cree Nation (NHCN) in Manitoba, Canada, this study developed a framework based on how Indigenous parents/caregivers of young children and community-based oral health decision-makers perceive 'quality of preventive oral health services'.

Methods: Concept mapping was used to develop the 'quality of preventive oral health services' framework. This involved brainstorming/idea generation, sorting and rating, visual representation, and interpretation sessions with parents/caregivers (CG) and decision-makers (DM) in Norway House, Manitoba. Using the Concept System's GlobalMax software, a conceptual framework was created that was modified from input from CG and DM groups, which can be visualized through the concept map.

Results: The final concept map revealed seven domains of quality preventive oral health services: dental staff character and skills, working with community, responsibilities in preventive education, inclusive preventive oral health strategies, accessibility to appointments, logistics of providing services, and dental environment.

Conclusion: This study provides insight into the existing gap in oral health services for Indigenous populations. Based on conversations and the concept mapping process, the developed framework can inform the steps to be taken to improve preventive oral health services for Indigenous peoples. The framework has been used to develop a quantitative scale to inform sustainable and impactful change in the quality of preventive oral health services that are meaningful to Indigenous peoples.

Keywords:

Canada, concept mapping, dental care access, Indigenous health, preventive dental care, satisfaction.

FULL ARTICLE:

Introduction

Indigenous peoples of Canada – First Nations, Inuit, and Métis – experience ongoing health inequities due to colonialism that negatively impact various health factors and social determinants of health[1,2]. Oral health care is no exception. Oral disease is highly prevalent and severe among Indigenous populations within Canada[3-5]. Dental disease occurs much earlier compared to the general population – as evident by the prevalence and severity of early childhood caries (ECC)[6,7]. In 2013, an Indigenous child was 8.6 times more likely to undergo general anesthesia for the treatment of ECC compared to the general population in Canada[6]. The early onset, high prevalence, and severity of dental disease among Indigenous populations create a high demand for restorative oral health care[7,8]. However, dental disease is preventable and preventive oral health care is the ideal approach to reducing the prevalence of dental disease[9].

In dental public health, there has been a rise in preventive-focused programs and studies for Indigenous populations[8,10,11]. Although many of these studies show reductions of dental disease and improvements based on current outcome goals at the community level, oral health disparities between Indigenous and non-Indigenous peoples persist. Similar Indigenous–non-Indigenous health outcome disparities cut across other fields of health care[2,3,5,6,11,12]. This demonstrates an urgent need to evaluate oral healthcare delivery – particularly preventive care delivery – to gain insight on how to better serve Indigenous communities for happier and healthier smiles. The Truth and Reconciliation Call to Action #19 calls for the actions of 'consult[ing] with [Indigenous] peoples, to establish measurable goals to identify, direct, and close the gaps in health outcomes for Indigenous peoples'[13]. The Truth and Reconciliation Commission of Canada was established to guide a process of truth and healing for the reconciliation of Canada with Indigenous peoples[14] and released the 94 Calls to Action to guide actions of reconciliation in numerous areas, including health[13,14]. (Reconciliation was described as the act of establishing and maintaining a mutual respectful relationship between Indigenous and non-Indigenous peoples, requiring awareness of the past, acknowledgement of the harm inflicted, atonement for the causes, and action to change behaviour[14].) The Call to Action #19 is important to this study, as Indigenous peoples of Canada have historically been excluded from the planning and evaluation of their own health and are under-represented in quantitative health data[2,15].

This study aimed to define 'quality preventive oral health services' in a First Nations, on-reserve community setting located in Northern Manitoba, Canada, to provide a framework of quality that reflects Indigenous perspectives and can be used in the planning and evaluation of preventive oral health services for Indigenous communities. To accomplish this, it was vital that the participants had direct involvement throughout all stages of the framework development, thus allowing for the control of data and information by the participants and their community[16]. For this reason, concept mapping methodology was selected.

The expectation was for the resulting framework to include Indigenous-specific considerations and contexts, which may be overlooked in other measures of dental satisfaction or quality of

care. Furthermore, the decision to create a new framework and new measurement tool is not based on creating evidence of the existing gap in oral health services between Indigenous and non-Indigenous populations; rather, the goal is to evaluate the needs and processes of closing the existing gap in preventive oral health care.

This study is part of the *Nistam Nipita* ('My First Teeth' in Cree language) study, which aims to prevent and reduce tooth decay in young Indigenous children (Principal Investigator (PI) Dr Herenia P. Lawrence). This article describes the development of the conceptual framework which in turn was used to construct a measurement tool to evaluate the preventive oral health services for Indigenous communities[17].

Methods

Population and setting

The study was conducted in partnership with the Norway House Cree Nation (NHCN). NHCN is a First Nations community on Treaty 5 land in Northern Manitoba, Canada[18], shown in Figure 1. The NHCN has a live-in dentist who works at the dental clinic during weekdays and a dental therapist who works at the school dental clinic[19]. Difficult dental cases are referred to Winnipeg (807 km south of NHCN via the highway) or Thompson (294 km north of NHCN via the highway), both of which are accessible via highway or by flight[19].

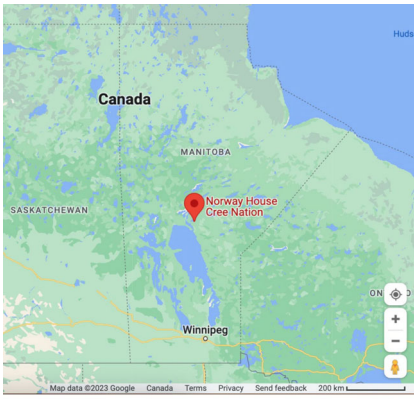


Figure 1: Map locating Norway House, Manitoba.

Community engagement

Prior to the study, the student PI (JBW, First Nation from the Squamish Nation) and the Nistam Nipita PI (HPL) met with community members and the NHCN Health Division in person to discuss the study goals and the proposed approach, ensuring that these reflected the needs and interests of the community. The student PI continued working in person for the entirety of the concept mapping processes.

Eligibility and recruitment

Participants fit into two groups (Table 1): community caregivers (CG) or community-based decision-makers (DM). The rationale for separate groups was that perceptions may differ between the groups, allowing for the exploration of 'quality of service' in its entirety; and that combining the groups may bring about unequal power dynamics, which may bias or limit data/statement collection.

Recruitment occurred with the help of a community oral health study coordinator, primarily through announcements on local radio, Facebook Messenger, and word of mouth (Table 1). Participants were invited to take part in any or all of the participant concept mapping tasks (brainstorming, sorting and rating, and interpretation sessions), but were not obliged to take part in all stages. For this reason, an informed consent process took place at each of the different stages. Participants received an honorarium to compensate them for their time, input, and to relieve travel or childcare costs for parents/caregivers to attend a session.

Table 1: Eligibility requirements and recruitment methods

	Parents/CG	Community-based DM
Eligibility requirements	• Primary CG of a child of 6 years or younger • Resident of the community (NHCN) and/or identified as Indigenous (First Nations, Inuit, or Métis) • Provides consent to participate	• Works in a field related to dental and/or health care or has influence on dental or healthcare decision-making in the community (NHCN) • Provides consent to participate
Recruitment methods	Within the community (NHCN) • Facebook Messenger • Phone • One-on-one discussions with the Community Oral Health Coordinator (hired by *Nistam Nipita* study) • Announcements on local radio station • Word of mouth by student PI (JBW)	Within NHCN Health Division • Email • Phone • One-on-one with community oral health coordinator

CG, parents/caregivers. DM, community-based decision-makers. NHCN, Norway House Cree Nation. PI, principal investigator.

Concept mapping

The concept mapping process follows five stages: brainstorming/idea generation, sorting and rating, representation, interpretation, and utilization of the conceptual domain[20]. All sorting/rating and mapping analysis was run through Concept System's GlobalMax Concept Mapping Software v2017 (http://www.conceptsystemsglobal.com)[21].

Preparations: To ensure that the conversations properly focused on the quality of preventive oral health care in Indigenous communities, the research team pre-tested a focal prompt, a set of pre-brainstorming prompts and definitions, a set of brainstorming prompts, and the rating criteria for the sorting and rating task (Tables 2,3).

Preventive oral health services were defined as those that had prevented problems with the mouth or teeth from occurring, or prevented current issues with the mouth or teeth from getting worse. This was to understand how to improve preventive care when the current status of oral health services is so heavily focused on restorative care.

Table 2: Brainstorming prompts and definitions†

Focal prompt: 'Quality preventative oral health care in my community is … [fill in the blank]'
Definition Preventive oral health care: Refers to any services/resources that prevents any problems with your or your child's mouth/teeth from arising OR prevents current problems from becoming a bigger problem.
Pre-brainstorming prompts
• What kind of preventive care have you received so far? • From dental workers? From non-dental workers? • What kind of preventive oral health education have you received so far? • What kinds of resources have you been provided to care for your/your child's teeth? • In addition to the services/resources available to you, are there any services/resources that you believe would be good for preventive oral care?
Brainstorming prompts
• Can you think of who provides any of these services/resources? • Are there any qualities/characteristics that the staff and/or management should have? • Who should make decisions to ensure that good quality services are being provided? • Sometimes people are scared to go to the dentist. Have you ever been nervous to go to the dentist? What are some things that staff can do to welcome and accommodate people who are nervous/scared to go to the dentist? • What would make it easier to go to the dentist? • Think about the physical space of your dental visits. What makes for a good space? • What kind of training should the staff/providers be given to serve the preventive oral health needs of your community?

† The focal prompt, definition of preventive oral health care, and pre-brainstorming and brainstorming prompts that were reviewed by the research team and set for the brainstorming session. Prompts were only used when the discussions in brainstorming sessions had slowed.

Table 3: Rating questions and responses†

Importance: Please rate, on a scale of 1 through 5, how important each statement is to you	1 = 'Not important to me' 2 = 'Slightly important' 3 = 'Somewhat important' 4 = 'Moderately important' 5 = 'Very important'
Feasibility: Please rate, on a scale of 1 through 5, how feasible it is to implement each statement	1 = 'Not at all feasible' 2 = 'Slightly feasible' 3 = 'Somewhat feasible' 4 = 'Moderately feasible' 5 = 'Very feasible'
Availability: Please rate, on a scale of 1 through 5, how available each statement is in your community currently	1 = 'Not at all available' 2 = 'Slightly available' 3 = 'Somewhat available'; 4 = 'Moderately available' 5 = 'Very available'

† Rating questions reviewed and set by the research team prior to the concept mapping process. Participants rated each final statement on its 'importance', 'feasibility', and 'availability' to them.

Brainstorming/idea generation:

Data collection Brainstorming sessions were held to generate ideas surrounding the quality of preventive oral health care in a First Nations community. The facilitator (JBW) led each session with the pre-brainstorming prompts and definitions (Table 2), followed by an introduction to the focal prompt 'Quality preventive oral health in my community is …'. Ideas were generated through participants' reflections and refining those statements to complete the focal prompt. Prompts were used if conversations veered from the main focus. Statements were recorded by the research team or by a paid recorder from the community.

At the end of each brainstorming session, the facilitator reviewed each statement with the group to ensure that it accurately reflected qualities of preventive oral health services and that it was worded in a way that captured the intended meaning. The facilitator brought an eagle feather – which had been gifted as a symbol of her journey of growing knowledge – to use as a talking stick. Talking sticks as an Indigenous methodology bring a philosophy of communication that reflects respect, resilience, reciprocity and responsibility into the conversation[22]. Using the talking stick, the sessions ended with reflections from each participant on a statement that stood out to them or on the brainstorming process itself.

Data analysis Overall, 111 initial statements were generated in the brainstorming stage and were coded by brainstorming group (CG group 1, CG group 2, and the DM group). The research team reviewed and synthesized the statement lists multiple times – accounting for similar or identical statements, overly complex or overly simple statements, and statements that did not answer the focal prompt – to create one manageable set of statements. The research team also reviewed the statements to ensure that the wording was clear, understandable, and formatted to fit the focal statement. A final list of 64 numbered statements (Table 4) was carried forward to the sorting and rating stage.

Table 4: List of final 64 brainstorming statements[†]

No.	Statement
1	Dental office staff adequately trained to work with children and adults with disabilities
2	Dental workers who can adapt to language barriers
3	A non-judgemental dental office environment
4	A range of dental appointment times to allow for flexibility
5	Dental office staff with good communication skills
6	Dental staff who are competent to provide quality care
7	Dental office staff ensuring that patients/parents feel confident in caring for their mouth and/or their child's mouth(s)
8	Having a dental surgeon available
9	Dental workers advertising reminders (e.g. radio song) in the community for children to brush their teeth
10	Dental office staff who are open minded and respectful
11	Dental office staff who are willing to help patients/parents with questions and concerns
12	Health workers that express the importance of dental needs among other health needs in the community
13	Friendly dental office staff
14	Dental workers and/or dental health programs advocating for oral hygiene products that are accessible and affordable
15	Dental workers providing education on the complications, risks, and treatment options for dental diseases
16	Dental office providing 24 hour dental emergency hotline
17	Involving parents in decision making regarding dental health planning for their children
18	Educating parents and patients about the prevalence and risk factors for dental problems within the community
19	Dental workers who are knowledgeable of the community's past experiences with dentists
20	Dental office having a safe, comfortable, private, and inviting reception area
21	Dental office staff ensuring patients understand their required treatment plan and seeking assistance (e.g. translator or guardian), if needed, to help them understand
22	A taskforce in the community to plan for long-term preventative oral health programming
23	Dental workers who understand the strengths of the community
24	Having dental workers provide preventative programming and education sessions in the community
25	Dental workers providing dental intervention and prevention strategies for all ages in the office and the community
26	Dental office staff who are energetic, humorous and engaging
27	Dental workers who are open to listening to patients' experiences with past dental work
28	Enough dental office space to serve the population size
29	A calm clinic environment
30	Accessible transportation to reach dental programming and services in the community
31	Dental office staff who conduct themselves in a professional way
32	Dental workers providing preventative dental health information sessions in the office and in the community
33	Dental workers who show effort to learn local language
34	Having preventative oral health information in common areas in the community
35	Dental office staff educating leadership (eg band counsel) on current oral health status, statistics, and history of oral health in the community
36	Educating patients on understanding the importance of dental needs among other health needs
37	Dental office providing assistance and advocacy for processing paperwork with NIHB
38	Walk-in appointments available outside of client work hours
39	An accommodating dental office space with equipment for all abilities and sizes
40	Dental workers having knowledge of oral health risk factors connected to other diseases, health problems and behaviours
41	Mentorship to encourage young community members to pursue dental careers
42	Dental workers knowing the culturally specific standards of the community
43	Enough dentists to treat the population size
44	Having reasonable wait times to receive treatment in dental office
45	Involving patients in decision making regarding their dental health planning
46	Dental workers providing education on the impact of poor oral health habits in a holistic manner (i.e. emotional, mental, financial, risk factors, all aspects of health)
47	Enough staff to fill different dental-related positions in the community
48	TV/entertainment in the waiting area of the dental office
49	Dental office staff providing preventative advice for problems with mouth or teeth when the patient is at risk for further treatment
50	Allowing an assistant or special needs worker to attend appointment with child or adult with disabilities
51	Dental office staff knowing services and coverage available and not available for members in the community
52	Dental workers engaging and encouraging children to brush their teeth at school
53	A child-friendly dental office
54	Dental staff who understand patients' potential dental anxiety and are trained to calm them
55	Providing guidance to local community members who want to enter dentistry – ie prerequisites, mentorship, shadowing
56	A clear cancellation policy at the dental clinic that is reasonable for both the clinic and the patient
57	Dental workers who are knowledgeable of the hardships of the community
58	A clean dental office
59	Dental workers having space to provide dental programming/sessions in the office and community
60	High priority appointments for children with disabilities
61	Dental workers providing various methods of dental education for different types of learners
62	Dentists who listen to needs and concerns of patients
63	Involving patients in evaluating their own or their child's oral health (i.e. viewing mouth to locate cavities, gum inflammation, other concerns)
64	Using dental office space efficiently to maximize service

[†] Statements came from both parents/caregivers and community-based decision makers. The statements provided were synthesized into this final list of statements, taking into account repeated statements, similar statements, as well as wording considerations.
NIHB, non-insured health benefits, a program provided by Indigenous Services Canada that provides eligible First Nations and Inuit clients with coverage for a range of health benefits that are not covered through other social programs, private insurance plans, or provincial/territorial health insurance.

Sorting and rating:

Data collection Participants were provided with the 64 numbered statements (Table 4) written on index cards and asked to sort the cards into piles in a way that 'made sense to them'. The rules were: (1) each card must be sorted into a pile, (2) a card can only belong to one pile and (3) the pile must be named with the theme it represents. All sorted statement card decks were recorded and retrieved for quality assurance and data entry.

Participants were then asked to rate each statement on a five-point Likert-type scale based on importance, feasibility, and availability (Table 3). Importance rating criteria were set up to provide insight into the priorities of preventive oral health care for the community, whereas feasibility and availability rating criteria were created to inform the planning of preventive oral health care for NHCN.

Representation:

Data analysis A series of maps created through hierarchal cluster analysis and multidimensional scaling by GlobalMax provided visual representations of the sorting and rating data. Point maps and cluster maps were generated from CG data only, DM data only, and Combined CG and DM data.

On the maps, each point represents one of the 64 statements. There is no magnitude or direction along the *x*- or *y*-axis; the statements are dispersed based on the likeliness that items were sorted together. Thus, it is the proximity of the points, not the location, that is important. The cluster maps are identical to their respective point maps but are physically grouped into *x* number of clusters based on the similarity of statements. Multiple preliminary cluster maps were generated and reviewed so that two maps of best fit were selected for each group (CG only, DM only, and CG and DM combined) based on initial judgement of the similarity of items within each cluster and the distinction between items in other clusters. These preliminary cluster maps (Appendix I) were carried to the interpretation stage.

Stress test The GlobalMax software performed a stress test on the sorting data to assess the 'badness of fit' or the inverse of a correlation coefficient. The lower the score, the better the concept map represented the correlation of items. Ideal stress test values are less than 0.36, which indicates the participants easily understood the statements and were able to sort them[20].

Interpretation:

Data collection Each group of participants (CG and DM) collectively reviewed their respective preliminary maps, looking at the groupings and items within each cluster. Each group decided on a map of best fit. Any modifications suggested were discussed and finalized as a group, after which the maps were finalized by labelling each cluster. Cluster labels were given through suggestions or modifications from the labels given in the sorting task, or through discussion between participants regarding the theme of the cluster.

Utilization of the conceptual domain The resulting concept maps and rating data informed the development of a measurement tool to assess the quality of preventive oral healthcare services in First Nations or Indigenous communities[17].

Ethics approval

Community engagement occurred prior to the study's commencement and received approval from the health director, oral health workers, program managers, and parents in the community. The study was approved by the University of Toronto Health Sciences Research Ethics Board (REB Protocol #37938) and the Norway House Cree Nation Chief and Council. The study and its design follow the guidelines provided by the Tri-Council Policy Statement (TCPS2 2018) on Research involving First Nation, Inuit, and Métis Peoples of Canada[23], as well as the First Nations principles of ownership, control, access and possession[24]. Participants were provided with a consent form at the beginning of each session, which they signed after their questions about the study were answered.

Results

The sample

The sample size varies between each of the concept mapping stages. Some participants took part in one stage but were unable to take part in the next stage, and new participants were recruited at later stages. Overall, 22 participants completed brainstorming, 24 completed sorting, 24 participants completed importance ratings, 23 participants completed feasibility and availability ratings, and 17 participants completed the interpretation sessions. All participants were from the NHCN and took part in the concept mapping tasks in person at the NHCN Health Division in Norway House, Manitoba. At least 88% or more of the participants at each stage were female. Of the caregivers, parents had 1–5 children, averaging at 2.2–2.5 children per caregiver. See Table 5 for a breakdown of CG and DM participants at each stage.

Table 5: Study outline and participant characteristics

Concept mapping stage				**Output**
Preparations – Research team				Brainstorming prompts, definitions and sorting/rating criteria
Brainstorming	**Characteristic**	***n***	**Value**	
	CG1+CG2	15	9 (CG1) 6 (CG2)	
	Age (years), mean±SD (range)	14	25.7±5.44 (16–33)	
	Female sex	15	14 (93%)	
	No. of children, mean±SD (range)	15	2.2±1.61 (0†–5)	
	DM	7		
	Age (years), mean±SD (range)	7	49.3±8.99 (37–59)	
	Female sex	7	6 (86%)	
				111 statements
Statement synthesis – Research team				64 statements
Sorting and rating	**Characteristic**	***n***	**Value**	
	Caregiver (CG)	17	Changes from brainstorming: 8 participants removed; 10 participants recruited	
	Age (years), mean±SD (range)	12	30.4±8.24 (17–52)	
	Female sex	17	15 (88%)	
	DM	7	Changes from brainstorming: 4 participants removed; 4 participants recruited	
	Age (years), mean±SD (range)	3	50.6±9.29 (40–57)	
	Female sex	7	7 (100%)	
Representation – Research team				Preliminary concept maps: CG-only, DM-only, and combined (CG+DM)
Interpretation	**Characteristic**	***n***		
	CG	13¶		Modified CG-only concept map
	DM	4¶		Modified DM-only concept map
				Final concept map and cluster list: Combined (CG+DM)
Utilization				Measurement tool (unpublished)

† Parent to be.
¶ All participants who took part in the interpretation stage took part in at least one other concept mapping stage.
CG, parents/caregivers. CG1, caregivers brainstorming group 1. CG2, caregivers brainstorming group 2. DM, community-based decision-makers. There was only one brainstorming group session for decision-makers.

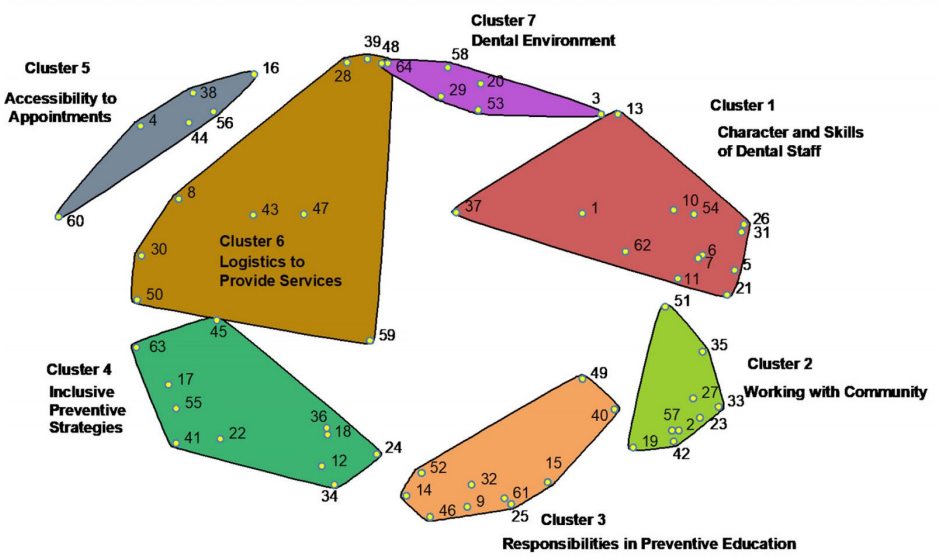
Developing the conceptual domain – brainstorming to interpretation

In total, 111 statements were generated from the brainstorming groups. Through seven rounds of statement synthesis, 28 items were identical and thus combined with another statement (total 83 statements), 20 items were similar and combined with another statement, 3 items were split due to double-barreled wording, and 2 items did not apply to the definition of preventive oral health services, thus producing a final list of 64 numbered statements. On average, 24 participants sorted the 64 index cards into 5.5 piles, a median of 5 piles, a maximum of 9 piles, and a minimum of 3 piles. The rating data held 23 completed rating datasets, with one participant completing the importance rating set, but not the feasibility or availability rating sets.

The research team created preliminary maps for both CG-only and DM-only groups – each consisting of six- to eight-cluster preliminary maps based on the judgement of the similarity of items within each cluster and the distinction between items in other clusters. The CG map had a stress score of 0.2293, the DM map 0.2556, and the combined (CG + DM) had a stress score of 0.2115 – showing low 'badness of fit', indicating that participants easily understood the statements and were able to sort them.

The CG-only group agreed on a six-cluster map as their map of best fit. Upon group discussions, 11 items were moved between clusters, providing the final CG cluster map. The DM-only group agreed on a seven-cluster map and moved six items between the clusters. These preliminary concept maps are shown in Appendix I.

The CG and DM concept mapping data was combined, yielding the combined CG and DM map. The combined CG and DM map was selected as the final concept map, as it included the sorting and rating data input from both the CG group and the DM group. The seven-cluster map was selected as the map of best fit. Then, based on the judgement of items and cluster fitting, 10 items were moved. Labels were determined from the suggested labels from the sorting task and from the labels provided in the CG and DM interpretation sessions. The combined map consists of seven clusters (Fig2, Table 6): character and skills of dental staff, working with community, responsibilities in preventive education, inclusive preventive strategies, accessibility to appointments, logistics to provide services, and dental environment. The combined map was used to develop a measurement tool informed by both caregivers and decision-makers.



† The map was generated based on both parent/caregiver and community-based decision maker brainstorming, sorting and rating data. The final framework consists of 7 domains/clusters (moving clockwise): 1 Character and Skills of Dental Staff, 2 Working with Community, 3 Responsibilities in Preventive Education, 4 Inclusive Preventive Strategies, 5 Accessibility to Appointments, 6 Logistics to Provide Services, and 7 The Dental Environment. Each point represents a statement (see statement list) and is located based on likeliness of being sorted with other statements. Final stress score is 0.2115 after 11 iterations.

Figure 2: The final concept map, 'Quality Preventive Oral Health Services in Our Community'.†

Table 6: Final cluster statement list[†]

No.	Statement
Cluster 1 **Character and skills of dental staff**	
1	Dental office staff adequately trained to work with children and adults with disabilities
5	Dental office staff with good communication skills
6	Dental staff who are competent to provide quality care
7	Dental office staff ensuring that patients/parents feel confident in caring for their mouth and/or their child's mouth
10	Dental office staff who are open minded and respectful
11	Dental office staff who are willing to help patients/parents with questions and concerns
13	Friendly dental office staff
21	Dental office staff ensuring patients understand their required treatment plan and seeking assistance (e.g. translator or guardian), if needed, to help them understand
26	Dental office staff who are energetic, humorous, and engaging
31	Dental office staff who conduct themselves in a professional way.
37	Dental office providing assistance and advocacy for processing paperwork with NIHB
54	Dental staff who understand patients' potential dental anxiety and are trained to calm them
62	Dentists who listen to needs and concerns of patients
Cluster 2 **Working with community**	
2	Dental workers who can adapt to language barriers
19	Dental workers who are knowledgeable of the community's past experiences with dentists
23	Dental workers who understand the strengths of the community
27	Dental workers who are open to listening to patients' experiences with past dental work
33	Dental workers who show effort to learn local language
35	Dental office staff educating leadership (e.g. band counsel) on current oral health status, statistics, and history of oral health in the community
42	Dental workers knowing the culturally specific standards of the community
57	Dental workers who are knowledgeable of the hardships of the community
51	Dental office staff knowing services and coverage available and not available
Cluster 3 **Responsibilities in preventive education**	
9	Dental workers advertising reminders (eg radio song) in the community for children to brush their teeth
14	Dental workers and/or dental health programs advocating for oral hygiene products that are accessible and affordable
15	Dental workers providing education on the complications, risks, and treatment options for dental diseases
25	Dental workers providing dental intervention and prevention strategies for all ages in the office and the community
32	Dental workers providing preventive dental health information session in the office and in the community
46	Dental workers providing education on the impact of poor oral health habits in a holistic manner (ie emotional, mental, financial, risk factors, all aspects of health)
52	Dental workers engaging and encouraging children to brush their teeth at school
61	Dental workers providing various methods of dental education for different types of learners
49	Dental office staff providing preventive advice for problems with mouth or teeth when the patient is at risk for further treatment
40	Dental workers having knowledge of oral health risk factors connected to other diseases, health problems and behaviours in the community
Cluster 4 **Inclusive preventive strategies**	
12	Health workers that express the importance of dental needs among other health needs in the community
17	Involving parents in decision making regarding dental health planning for their children
18	Educating parents and patients about the prevalence and risk factors for dental problems in the community
22	A taskforce in the community to plan for long-term preventive oral health programming
24	Having dental workers provide preventive programming and education sessions in the community
34	Having preventive oral health information in common areas in the community
36	Educating patients on understanding the importance of dental needs among other health needs
41	Mentorship to encourage young community members to pursue dental careers
55	Providing guidance to local community members who want to enter dentistry – ie prerequisites, mentorship, shadowing
63	Involving patients in evaluating their own or their child's oral health (ie viewing mouth to locate cavities, gum inflammation, other concerns)
45	Involving patients in decision making regarding their dental health planning
Cluster 5 **Accessibility to appointments**	
4	A range of dental appointment times to allow for flexibility
16	Dental office providing 24 hour dental emergency hotline
38	Walk-in appointments available outside of client work hours
44	Having reasonable wait times to receive treatment in dental office
56	A clear cancellation policy at the dental clinic that is reasonable for both the clinic and the patient
60	High priority appointments for children with disabilities
Cluster 6 **Logistics to provide services**	
8	Having a dental surgeon available
30	Accessible transportation to reach dental programming and services in the community
43	Enough dentists to treat the population size
47	Enough staff to fill different dental-related positions in the community
50	Allowing an assistant or special needs worker to attend appointment with child or adult with disabilities
28	Enough dental office space to serve the population size
39	An accommodating dental office space to serve the population size
64	Using dental office space efficiently to maximize services
59	Dental workers having space to provide dental programming/sessions in the office and community
Cluster 7 **Dental environment**	
20	Dental office having a safe, comfortable, private, and inviting reception area
29	A calm clinic environment
48	TV/Entertainment in the waiting area of the dental office

53	A child-friendly dental office
58	A clean dental office
3	A non-judgemental dental office environment

† This table corresponds to the final concept map 'Quality of Preventive Oral Health Services in Our Community'. Final stress score is 0.2115 after 11 iterations.
NIHB, non-insured health benefits, a program provided by Indigenous Services Canada that provides eligible First Nations and Inuit clients with coverage for a range of health benefits that are not covered through other social programs, private insurance plans, or provincial/territorial health insurance.

The clusters (combined CG and DM map)

Character and skills of dental staff (cluster 1): Cluster 1 touches on patient–practitioner interactions; how dentists and office staff interact with and serve their patients. 'Character' refers to the characteristics of the dentist/office staff, who improve quality of care but are not necessarily trained (ie staff who are friendly, open-minded and respectful). 'Skills' refers to the competencies of the dentist/office staff to provide quality care (ie communication skills, professionalism, working with disabilities).

Working with community (cluster 2): Cluster 2 focuses on adapting to serve and work with an Indigenous community. Items encourage providers to learn about the community and its history – both in general, and regarding oral health. Examples of this include '[being] open to listening to patients' experiences with dental work' and understanding the hardships and strengths of the community. Additionally, informing and involving the community are meaningful in working with Indigenous communities, for example educating leadership (such as Band council) on current oral health status, statistics, and history of oral health in the community.

Responsibilities in preventive education (cluster 3): Cluster 3 outlines expectations of preventive programming and the delivery of preventive oral health education. Items discussed targeted preventive education strategies, catering delivery to patients of different ages or stages of life and with different learning abilities, and providing education in different settings or locations. The domain also communicates that oral health should be approached holistically (ie emotional, mental, and financial impacts; risk factors for all aspects of health).

Inclusive preventive strategies (cluster 4): Cluster 4 discusses the inclusivity of preventive care – both at individual and community levels. The individual level includes informing and involving patients/parents in their own treatments and in their child's treatment, and ensuring that patients/parents understand all information provided. The community level includes involving community members and leadership in oral health planning and building capacity within the community for members to enter dental-related careers.

Accessibility to appointments (cluster 5): Cluster 5 describes barriers to schedule an appointment or reach the dental clinic for oral health care and information. This includes clinic hours, wait times, cancellation policies, priority appointments, and the ability to contact the clinic for information.

Logistics to provide services (cluster 6): Cluster 6 explores the capacity to provide services in the community. This primarily regards the staff and space available, but also includes accessible transportation to reach dental programs and services in the community.

Dental environment (cluster 7): Cluster 7 describes characteristics of the dental office space. Items in this domain describe an approachable environment (eg the reception being 'safe, comfortable, private, and inviting').

Discussion

Caregivers and community-based oral-health-related decision-makers of the NHCN used concept mapping to create a framework of 'quality preventive oral health services' in a way that is important and meaningful to this First Nations community and potentially to other Indigenous communities. The final framework, visualized in Figure 2 and outlined in Table 6, consists of seven clusters or dimensions of quality care that impact preventive oral health among Indigenous peoples.

The clusters

Character and skills of dental staff (cluster 1): Cluster 1 discusses the competencies of dental staff to provide quality clinical services, but also addresses required competencies to improve the overall safety of Indigenous patients. One point of discussion was 'ensuring that patients/parents feel confident in caring for their mouth or their child's mouth' (statement 7). In preventing dental disease, it is important that the patients feel that they are capable to care for their mouths. This confidence promotes the self-efficacy of patients and continual preventive oral healthcare efforts at home[11]. Instilling confidence into parents/patients regarding self-oral health practices may dismantle the effects of patient shaming – whereby patients/parents are made to feel ashamed for the resulting health effects of colonization and the systematic barriers that Indigenous communities are faced with[25-29]. Participants also expressed the need for dental staff to understand patients' potential dental anxiety (statement 54). With the knowledge and awareness of historical traumas and dental care for Indigenous peoples, learning to calm and create a safe environment for those affected by dental anxiety and dental fear leads into trauma-informed care.

Working with community (cluster 2): Cluster 2 presents unique ideas about quality oral health care and prevention through relationship-building and learning about the First Nations community. Relationship-building in this context does not refer solely to the relationship between the health provider and the parent or patient (such as in cluster 1). It also refers to the relationship with the community as a whole – both professionally and personally. Participants expressed the importance of understanding the 'culturally specific standards of the community' (statement 42) – which vary from community to community, as no two Indigenous communities are identical[28]. The discussions behind this statement brought about various aspects of care specific to the culture and historical traumas of a northern First Nations community in Canada. Participants echoed the relevance of a holistic view of health and wellness, as well as the need for cultural safety training among oral health workers. Developing training for dental professionals and staff has been noted in other research and recommendations to abate the perception of cultural differences as the root cause of this issue[28,30,31].

Participants also stated the importance of dental workers who are knowledgeable of the community's history with dentists and who are willing to listen to patients' past experiences with dental care (statements 19 and 27). This can build into knowledge of the history and relationships Indigenous communities have with healthcare workers and researchers, as well as the structural policies affecting oral health[28,30,32]. The inclusion of local leadership in efforts to improve community oral health (statement 35) was also expressed. Building relations with the community will reveal the hardships faced due to the effects of colonialism, but also the strengths of the community. Understanding both is imperative because in order to work with communities for a common goal, there needs to be an understanding of what barriers the community is facing and what strengths are available to build and shape the desired outcomes[28]. Relaying information to local leadership (such as Band council, the local community health authority) allows for the establishment of good relationships at a community level and for the utilization of the strengths of the community to uplift and engage in oral health care[28,33]. Overall, connecting with the community and understanding and learning from the history between Indigenous peoples and health care are essential take-aways from this domain.

Responsibilities in preventive education (cluster 3): Oral health education is an essential component of preventive oral health care. Statements grouped in this cluster describe some of the expectations and suggested approaches for oral health education. Many of these statements describe ideas that are well established in preventive oral health care. Examples are providing education on the complications, risks, and treatment options for dental diseases and providing preventive advice when a patient is at risk for worsening oral health (statements 15 and 49), or dental workers providing preventive oral health information in the dental clinic and community (statement 32). Other statements provide insight into improving oral health education in a First Nations community context. Starting from reaching/accessing information, participants expressed the desire for reminders or information relayed over the local radio, as well as encouraging brushing teeth at school (statements 9 and 52). These reflect the successes witnessed from other health programs in the community and the use of kinship within a First Nations community – especially for children – in which caring for the younger generations is seen as a community effort. Participants also called for a more holistic approach – not only in all aspects of health (emotional, mental, spiritual, physical, financial, risk factors) and age ranges (statements 46 and 25), but also incorporating aspects that are specific and important to the community (statement 40). With each Indigenous community being unique, it is important that the care provided is created in a meaningful and holistic approach that is specific to the interconnected needs of that community. Lastly, preventive education can be bottlenecked by accessibility barriers to acquiring accessible oral health hygiene products (eg having oral health knowledge, but not having oral hygiene products). Dental workers and oral health programs have been called on to advocate for accessible and affordable oral health hygiene products (statement 14).

Inclusive preventive strategies (cluster 4): Cluster 4 outlines the act of patient/parent inclusion, as well as building community capacity to provide dental care and take part in decision making for oral health care. At the patient/parent level, participants expressed that patients/parents should be informed and included in the decision making of a treatment plan (statements 17, 63, and 45). There is also a call to increase the number of Indigenous healthcare workers and healthcare training for Indigenous peoples[13] (statements 41 and 55). Indigenous sovereignty is a vital component of Indigenous community growth and community health care[28]. As the leadership and peoples of First Nations and other Indigenous communities become more involved in the planning and implementation of health care and programming, the more appealing, approachable, and accessible these services become.

Accessibility to appointments (cluster 5): Preventive oral health care, in addition to preventing the emergence of dental disease, includes preventing existing dental disease from worsening. Cluster 5 describes the barriers to schedule an appointment or reach the dental clinic for oral health care and information – from physical/time barriers to accessing oral health care. This includes clinic hours (statements 4 and 38), wait times (statement 44), cancellation policies (statement 56), priority appointments (statement 60), and the ability to contact the clinic for information (statement 16). First Nations communities often balance various dire and immediate needs due to many social inequities communities struggle with. Acknowledging and adapting to time and scheduling barriers may include opening appointment slots after work hours or adjusting to a multi-modal appointment system. This will naturally vary between communities and is recommended to be based on community-specific needs.

Logistics to provide services (cluster 6): Cluster 6 explores accessibility via the capacity to provide services in the community. Statements discuss barriers and challenges to the capacity and infrastructure of providing services to the community. This is primarily the staff and space available (statements 8, 27, 38, 42, 46, 58, and 63), but also includes accessible transportation to reach dental programs and services in the community (statement 30). Transportation is a barrier to health services for Indigenous communities, especially for those communities that are further from a city centre[1,3]. Furthermore, services available in northern Indigenous communities may be limited due to the staff or space available – which can restrict the number of people who can access services at one time, thus lengthening wait times to reach services[1,3]. These logistical barriers demonstrate the importance of physical access to care to preventive oral health care for Indigenous communities.

Dental environment (cluster 7): Cluster 7 describes the dental office space and the environment that surrounds it. Items in this cluster show similarities to those in the Dental Satisfaction Questionnaire[34] – a commonly used tool to assess the quality of dental care. Items that show similarities include 'cleanliness' and 'child-friendly space' (statements 58 and 53), and the modernness of the office (statement 48). Validity testing of this developed framework has been performed to explore this comparison along with other measures of quality dental care and all domains of this developed framework[17].

Accessibility

Many statements in this framework include approachability and acceptability of health services, which are proxies for access to care. Access to care has a substantial impact on the prevention of dental disease. 'Access' is a common factor in frameworks and measurements of quality care[35-39]. The findings in this article

parallel with measures of 'access' in terms of quality oral health care, while also including an Indigenous public health perspective on accessibility[1]. Aligning with current measures of quality oral health care, select statements refer to the physical accessibility – including the staff, space, and clinic times available to reach dental services in the community. Other statements refer to the acceptability of services – discussing inclusivity, approachability, and safety of the environment[1]. In terms of approachability, relationship building is vital to improving the trust and safety of Indigenous communities towards healthcare providers. This includes services that are free of bias, discrimination, and racism; respect the holistic health needs of Indigenous peoples; and are created with the inclusion of Indigenous peoples in the provision of care[1]. Furthermore, this research reaffirms the importance of approachability in the prevention of disease[28,30].

Current state of preventive oral health services

A theme to highlight in this study is the imbalance of primary, secondary, and tertiary forms of preventive services for Indigenous communities. Generally, preventive dental programs and studies cater to reach secondary prevention – early detection of disease and to minimize its morbidity through early treatment of the effects of the disease[9]. An example of this is screening and fluoride treatments, which seem to be the only preventive intervention thus far to present the highest level of evidence and a high recommendation grade[9]. In the general population, dental efforts are working towards primary prevention, where the development of dental disease is avoided by addressing the risk factors and determinants of dental disease[9]. Whereas the general population may be reaching towards primary prevention, Indigenous peoples are still making the transition from tertiary prevention to secondary prevention.

Most oral health care in Indigenous communities generally serves tertiary prevention strategies – services to alleviate complications of existing disease, as well as restoring function and reducing disabilities due to the existing dental disease[9]. Tooth extractions have long been the norm for many Indigenous peoples[32], and unfortunately continue to be the case in some Indigenous communities[3,5,11,32]. With such high demand for restorative treatment, wait times are longer and diagnoses are delayed, leading to less continuity of care, and decreasing the effectiveness of treatment – with many children undergoing repeated surgery under general anaesthesia for early childhood caries[1,40].

Limitations

Participant recruitment and retention had its challenges. All concept mapping sessions were held in-person in Norway House, Manitoba, where the student PI flew in from Toronto, Ontario. Scheduling was limited to the availability of space and participants. Schedules for parents/caregivers are not always predictable, and some participants were unable to attend all sessions of the concept mapping tasks. However, although the sample size was small, it was similar to that for other concept mapping studies[41]. Upon notification of participant drop-out, the student PI would recruit CG participants by word of mouth at the local mall. The study took place in one community, which potentially impacts the generalizability of the framework. However, the applicability of these findings to other First Nations communities will be explored in future work.

Conclusion

Efforts to improve the oral health of Indigenous peoples remains an important task. Moving forward, it is important to reflect on the quality of care that is provided to ensure that it is done by the standards that Indigenous communities set out for oral healthcare providers. This study defined 'quality preventive oral health services' in the context of a northern First Nations community. The resulting framework outlines several dimensions of quality care that impact preventive oral health among First Nations by acknowledging Indigenous social determinants of health. Although our results reflect the needs of a specific First Nations community, this may be applied to other northern and rural First Nations communities, and perhaps to other Indigenous populations.

This framework was translated into a measurement tool to evaluate the preventive oral health services for Indigenous communities[17] and assessed through Bombardier's Assessment of Sensibility[42]. Ongoing validity testing is being performed among multiple First Nations communities. A naming ceremony will be held with the participating community and its members, as language plays an important role in providing meaning and ownership of the resulting framework.

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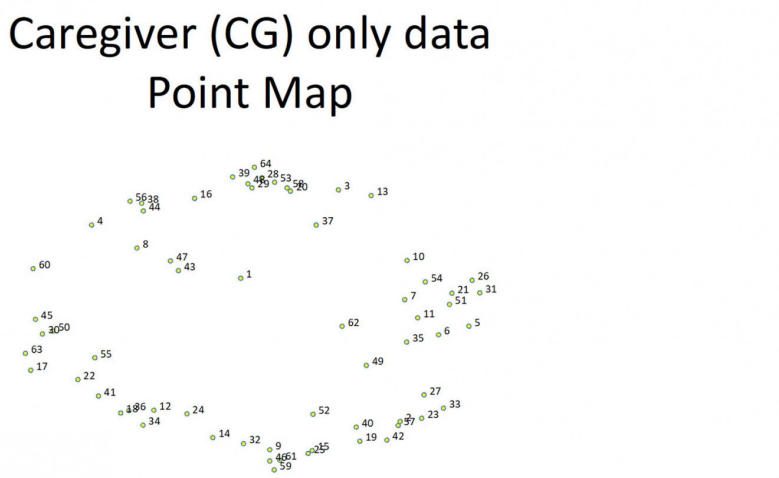
APPENDIX I:

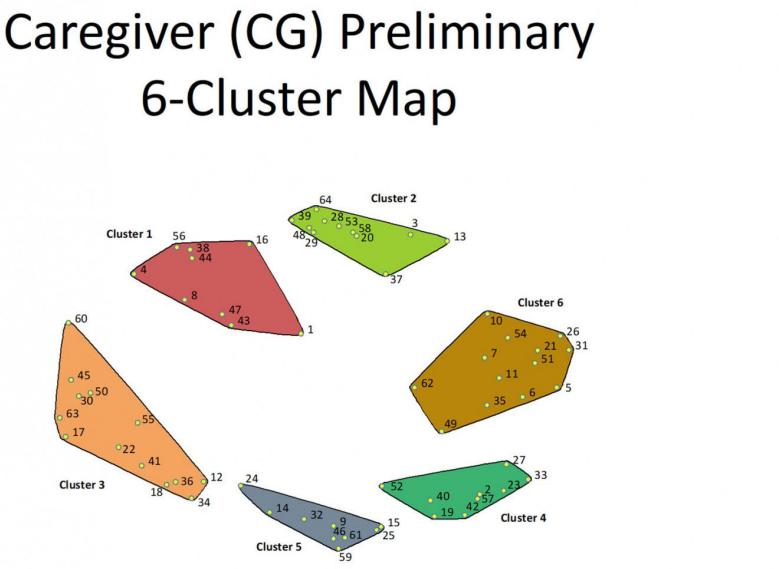
Appendix I: Preliminary cluster maps

Figure S-1: Caregiver CG-Only Maps
Each dot represents a statement (see numbers) and are mapped out based on the proximity of statements to each other – or how commonly statements were sorted together. (a) Caregiver Point map; (b) Caregiver Preliminary 6-cluster concept map; (c) Caregiver Preliminary 7-cluster concept map; (d) Caregiver Modified 6-cluster concept map

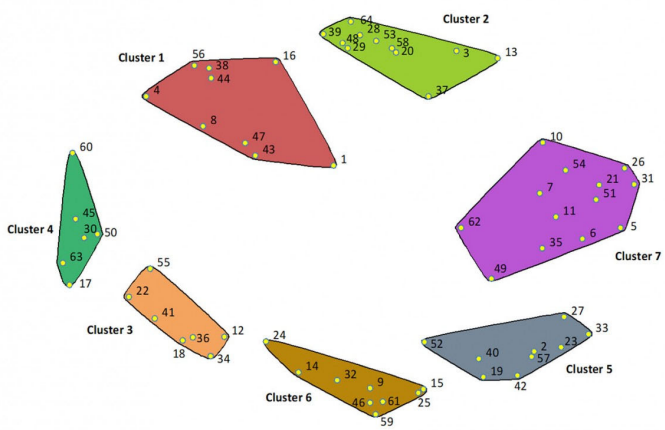
(a)



(b)



(c)



(d)

Caregiver (CG) Modified

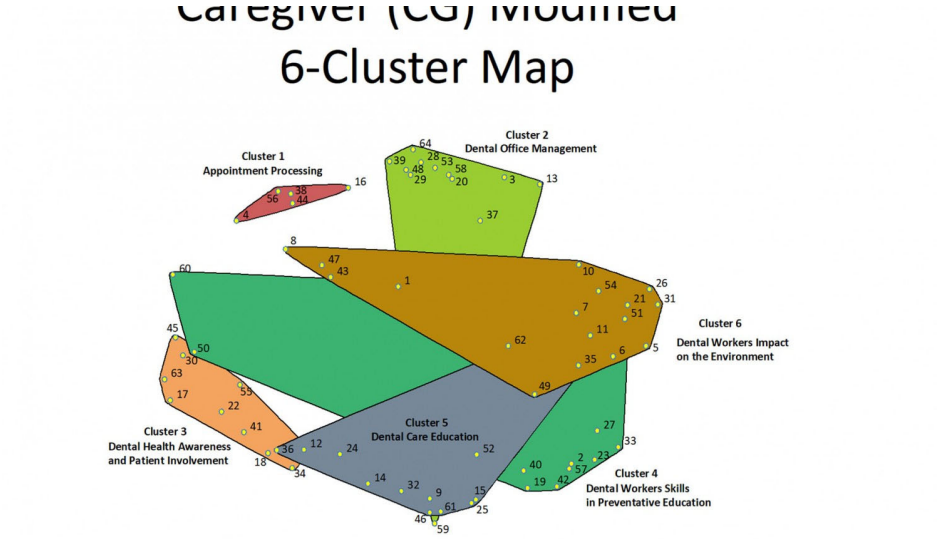
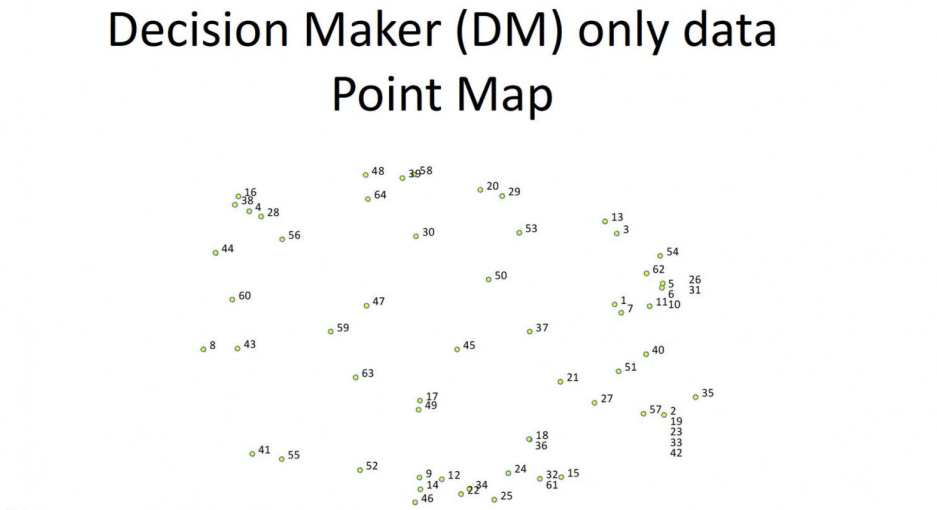


Figure S-2: Decision Maker DM-Only Maps
Each dot represents a statement (see numbers) and are mapped out based on the proximity of statements to each other – or how commonly statements were sorted together. (a) Decision Maker Point map; (b) Decision Maker Preliminary 7-cluster concept map; (c) Decision Maker Preliminary 8-cluster concept map; (d) Decision Maker Modified 8-cluster concept map

(a)



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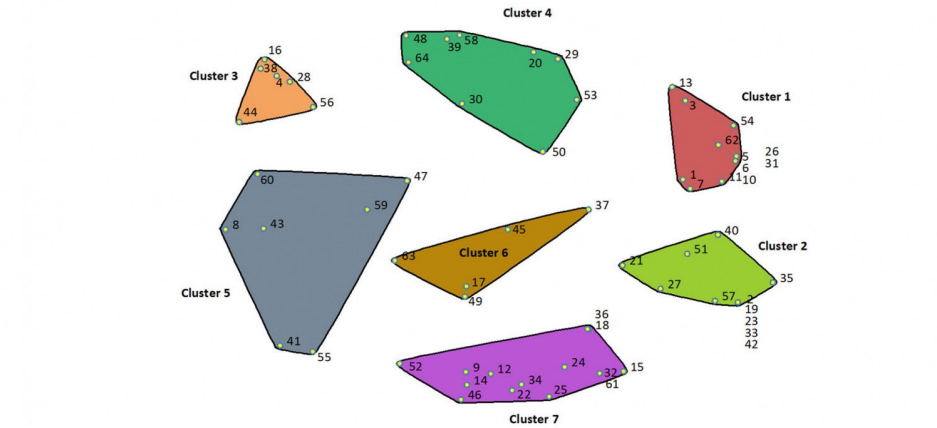
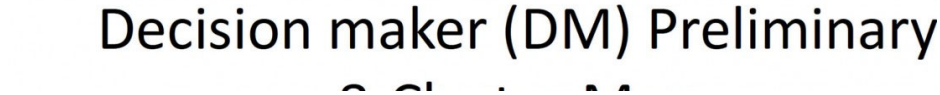
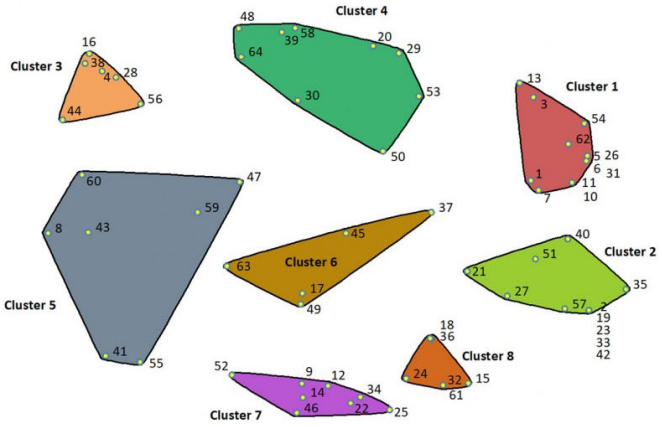


(c)



8-Cluster Map



(d)

Decision makers (DM) Modified 7-Cluster Map

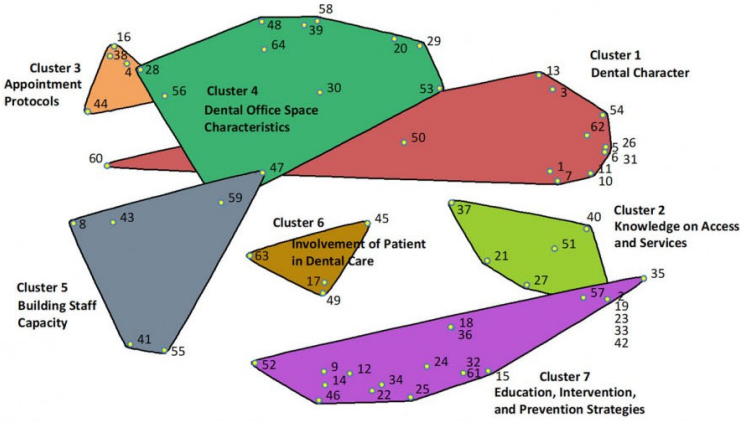
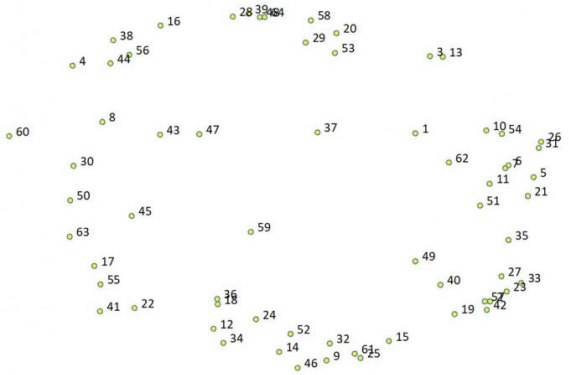


Figure S-3: Combined (CM + DM) Maps Each dot represents a statement (see numbers) and are mapped out based on the proximity of statements to each other – or how commonly statements were sorted together. (a) Combined Point map; (b) Preliminary Combined concept map

(a)

Combined (CG +DM) data Point Map



(b)

Preliminary Combined Cluster Map